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To my Family and specially my

Grandfather Manuel Florindo

Abstract

This report aims at describing my career from Technical Support Engineer at Altitude software to Architect at Microsoft and the projects I participated either in Portugal or abroad.

In today's world technical skills are very important but alone do not guarantee success. Besides being a technical expert in the software products, to be a good professional one must understand the customer requirements, the business needs and be prepared to help the clients, as a trusted advisor, on the IT journey. Technical and soft Skills are equally important. This document reflects on these matters based on my experience during the last 13 years of practice.

Keywords:

- Contact Center
- Project Management
- Architecture
- Communications

Resumo

Este relatório tem como objetivo descrever a minha carreira profissional, de Engenheiro de Suporte Técnico a Arquiteto na Microsoft, e os projetos que participei quer em Portugal, quer no estrangeiro.

Nos dias de hoje as competências técnicas são importante mas não são garantia de sucesso. Para ser um bom profissional, além dos conhecimentos técnicos, é necessário perceber os requisitos dos clientes, as necessidades do negócio e estar preparado para ajudar os clientes nesta caminhada. Competências técnicas e competências sociais são igualmente importantes. Este documento apresenta uma reflexão sobre estes assuntos e tem como base a minha experiência dos últimos 13 anos de carreira.

Palavras-Chave:

- Centro de contacto
- Gestão de projecto
- Arquitectura
- Comunicação

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Glossary

Agents: agents interact with contacts on behalf of an organization. Agents answer contact questions, resolve contact problems, or persuade contacts to do an action, such as buying a product. Agents can be classified into two groups: human (Supervisors, Agents and Team leaders) and non-human (Interactive Voice Response System- IVR). Human agents can handle calls, emails and web collaborations. Non-human agents can only handle calls.

Agent Scripts: guide agents through calls, emails and web collaborations. Agent scripts can access call information on the telephony switch, react to telephony events and integrate with databases. Human agent scripts consist of a series of screens. Non-human scripts are a set of instructions and do not include screens.

Altitude Script Language (ASL): is a programing language that can be used to create agent scripts that will be executed by the agents or the Interactive Voice Response System (IVR) to achieve business goals.

Campaign: created to fulfill a business outcome. Campaigns have contact data and campaign data, agents and a script associated.

Contact: person that will be contacted as part of a campaign. To be valid, a contact must have at least one phone number.

Dialogic Card: is used in automated telephone systems to allow for predictive dialing, conferencing services and interactive voice response (IVR). Dialogic cards are mostly used in Interactive Voice Response Systems. These cards were originally an Intel Corp. product. The Dialogic voice drivers are capable of making calls, answering calls, identifying caller ID, playing and recording sounds from the line, and detect Dual-Tone Multi-Frequency (DTMF) signals (touch tones) dialed by the caller. It can tear down a call and detect when the caller has hung up.

Easycode: pre-defined attribute that uniquely identifies a contact in the Altitude system.

Inbound: person (contact) initiates the interaction with the contact center. The interaction can be in the form of email, call or web collaboration. Email and web collaboration interactions are handled only by human agents. Calls can be handled by IVR's or human agents. In most scenarios the call flow is as

follows: the contact calls the contact center number (in most cases an 800 toll free number) and the call gets answered by an Interactive Voice Response (IVR) system; the IVR runs a script with a set of instructions and plays prompts (pre-recorded voice wave files) to guide the contact through the menu options. In some cases the call is then transferred to a human agent, which also follows a script.

Loquendo: Computer software Technology Corporation, headquartered in Torino, Italy, that provides speech recognition, speech synthesis, speaker verification and identification applications.

Outbound contact: contact center agent initiates the interaction with the person, by default by calling the contact. The contact information is loaded into a campaign and the system, based on business rules, generates a call to the contact. Once that call is answered the agent will follow a script with instructions.

XML: Extensible Markup Language (XML) is the universal format for data on the Web. XML allows developers to easily describe and deliver rich, structured data from any application in a standard, consistent way. XML does not replace HTML; rather, it is a complementary format.

Siebel CRM: Siebel is an Oracle Software for Customer Relationship Management (CRM).

SOAP: Simple Object Access Protocol (SOAP) provides a simple, extensible, and rich XML messaging framework for defining higher-level application protocols offering increased interoperability in distributed, heterogeneous environments.

1. Introduction

I have started my career as Technical Support Engineer, in October 2000, for Altitude Software, immediately after my graduation as an Informatics Engineer from University of Coimbra in September 2000.

During four years, I was a Technical Support Engineer and I had the pleasure to work in Austin, Texas, United States and Lisbon Portugal. In 2004 I became a Technical Account Manager (TAM) for Benelux, Central and Eastern Europe, based out of Brussels.

In 2005 I have returned to Portugal and joined the Global Professional Services (GPS) team as a Consultant. During four years in the GPS I participated in several projects, in Portugal and abroad, and evolved in my role and responsibilities.

In December 2009 I joined Microsoft as a Voice Technical Solution Specialist (TSP) responsible for the South of Europe Market (Portugal, Spain and Italy). As TSP I had the opportunity to participate in several proposals across Portugal, Spain and Italy in big companies from Telecom, Oil & Gas and Public sector.

In December 2012 I joined the Microsoft Western Europe team as an Architect, responsible for developing the Enterprise Social and Communications business across 14 countries (Portugal, Spain, Italy, Netherlands, Belgium, Luxemburg, Austria, Switzerland, Denmark, Sweden, Finland, Ireland, Norway and Iceland).

The aim of this document is to present the work I have developed in the last 13 years of practice, from Technical Support Engineer to Enterprise Social and Communications Architect and to present some reflections on the lessons learned along this process.

In this document I describe my professional career from September 2000 to March 2014. And for each phase of my career I chose one project that I find representative of my professional activity to be described in further detail. The project selection criteria was based on two pillars:

1) Technical challenge and
2) My role and responsibility level

The document ends with a retrospective of my career and my development plans to grow and evolve in my profession.

1.1 Professional Career

I have graduated in Informatics Engineering from University of Coimbra in September 2000, and joined the Program Contact 4 from AICEP were I was assigned to Altitude Software for the national and international internship, as a Technical Support Engineer (TSE). After the national internship (three months) I moved to Austin, Texas, United States for the international internship. The main goal of this position was to provide support for North American Customers (Canada and the United States) on the

complex integration issues associated with business solutions built on the Altitude Software platform. The position supported a diverse variety of technical solutions built with Altitude Software technology integrated with 3rd party products like Databases (Oracle, Microsoft SQL, Sybase and Informix), Private Branch Exchange (PBX's) (Cisco, Avaya, Alcatel, Ericsson) and other business applications or customer platforms. Typical tasks performed included incident classification and analysis, specific problem isolation and correction, user mode debugging, supportability reviews, performance tuning, application troubleshooting, code reviews, porting/migration assistance, configuration management, pre-rollout testing and general development consulting. In December 2001 Altitude invited me to join their work force, so when my international internship finished I joined Altitude Software as a full time employee and moved back to Lisbon, Portugal. My role was the same, Technical Support Engineer, but my support geography was European and Arabic Countries.

In 2004 I was invited to become a Technical Account Manager (TAM) for Benelux, Central and Eastern Europe, based out of Brussels. The TAM had a broad vision of all Altitude Software products and services and was positioned as a trusted advisor, guiding customers at all operation levels. A TAM also manages and solves a diverse scope of support issues and works with management when necessary to resolve sensitive issues. Additional functions included, escalating issues to guarantee problem resolution according to acceptable Service Levels, assessing customer's risks and needs, recommending appropriate service offerings to proactively address potential problems.

As a TAM I had the opportunity to work with customers like BreBank in Poland, European Union in Belgium, Sitel in the Netherlands, among many others.

In 2005 I have returned to Portugal and joined the Global Professional Services (GPS) team as a Consultant.

Technical consultancy combines a business analysis approach with strong technical skills, mapping customers' requirements with Altitude Software Products ensuring the appropriate delivery of contact center projects. A Consultant must have both, broad and deep technology knowledge and the ability to architect a solution by mapping all customer's business requirements to an end-to-end technology solution.

1.1.1 Database Purge at Caixa Geral de Depósitos

My first project as a consultant was the Database Purge at Caixa Geral de Depósitos (CGD). The objective of the project was to reduce the size of the production database, which was affecting the overall performance of the system, by moving part of the information to a Historical database and later to tape. The information flow was based on a timestamp and type of data (business data or contact center interactions data). I was responsible for the overall solution from requirements gathering, development, quality assurance and training the CGD operations team and production team. This project was a challenge attending to the technologies involved, Informix and AIX, and because it was a 24x7 production system serving around 400 contact centers agents. Downtime was unacceptable. It

was my first project as a consultant, were I was fully responsible for delivering in budget, time and quality. This project meets the selection criteria and is detailed in the chapter 2.1.

1.1.2 Infrastructure Migration Coopervision

My next project was Coopervision at Rochester, United States of America, were I have integrated a larger team of consultants from several countries (United Kingdom, United States, Germany and Portugal) and several companies (Altitude Software, Cisco and British Telecom). On this project I was responsible for the migration infrastructure (hardware and software versions) and connection to 3rd party systems like Cisco PBX. Regarding technology it was a clean installation followed by a database migration executed during the weekend, as this was a 9 am to 5 pm weekdays contact center. Communication, cultural differences and soft skills were the biggest challenge of this project. My biggest learn from this project was that even if everything works perfect in terms of technology, poor communication and insufficient stakeholder's management can compromise the success of a project.

1.1.3 Linha Directa at Caixa de Crédito Agrícola Mútuo (CCAM)

At the beginning of 2006 I have joined the project team of Linha Directa at Caixa de Crédito Agrícola Mútuo (CCAM) for nine months. It was a green field project, creating a contact center from scratch. The business goal was to allow CCAM customer to execute banking operations (ex: transfers, payments, request checks, credit card related operations) over phone, either on a more autonomous approach, by interacting with an IVR, or with a more personal approach by interacting with a contact center agent. The project included the development of one Interactive Voice Response (IVR) campaign and two agent campaigns.

Altitude IVR was integrated with Loquendo for Automatic Speech Recognition, allowing the users to navigate through the menus using the phone keys – Dual Tone Multi-Frequency (DTMF) – or by Voice recognition.

In this project I was responsible for developing the agent scripts, code-reuse framework and test the IVR Speech Recognition system. The development of the agent scripts was done with Altitude Script Language (ASL).

This project had 4 major technical challenges:

1) Banking transactions: due to security, business applications cannot execute transactions directly on the banking core mainframe, independent if they are reading or writing transactions. The IVR and booth agent scripts need to execute banking transactions.
2) Code re-use: booth IVR and agent scripts execute access to several databases, invoke banking transactions and execute similar functions. We needed to identify a pattern to maximize code reuse, normalize error messages and speed up bug detection and fixing.

3) Speech recognition: this was the first Altitude project with Speech recognition and also the first Loquendo project with Portuguese language.
4) User security and Personal Identified data (PID): how to handle the user authentication protecting from eavesdropping and how to protect PID on logging system.

Let me explain how we solved these challenges:

Banking transactions

As mentioned above, the agent and the IVR scripts needed to execute banking transactions on the bank core mainframe system. For security reasons no system can access directly to the mainframe, CCAM provides a web service, called *plataforma multicanal*, which publishes all the necessary transactions. The project team developed a gateway that was used by the IVR and agent campaign scripts to access the *plataforma multicanal* and execute the banking transactions. The architecture is described in the figure Figure.1.

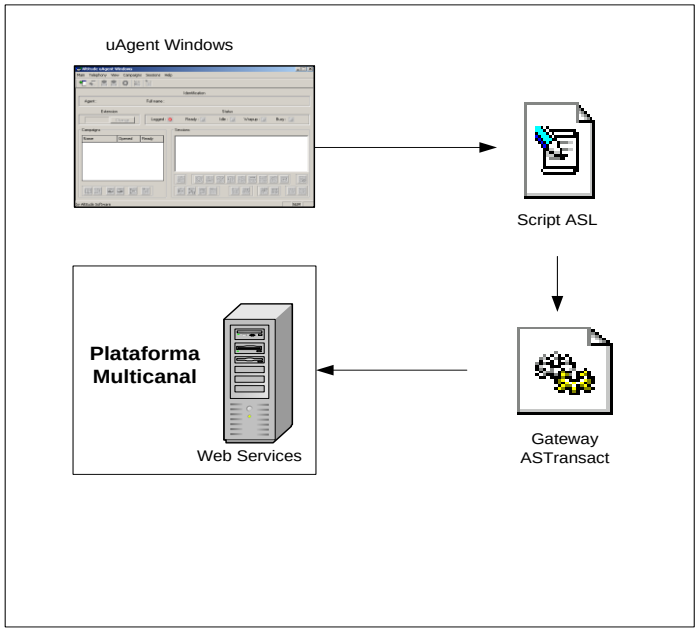

Figure 1.1 - Mainframe transactions high-level architecture.

Code Reuse Framework

This was a key activity for the team as it was going to affect the development and testing phases but also future maintenance and operation activities. We spend some time to identify unitary and generic instructions like: insert integer into database; insert datetime into database; select number from database; write log into file. Once we had the instructions the next step was to identify the output scenarios. For example, some instructions would receive and return parameters (functions), while others would simply return a Boolean indicating success or failure (routines). The routines and functions

were then grouped in modules based on the type of instructions executed, for example database routine module or database functions module.

For the project we developed several modules that were shared with IVR development team and the agent scripts team.

This practice revealed very useful once we started the testing phase specially when corrections where needed. Our code was shared and reused in other Altitude projects becoming a best practice in other projects to enhance this library with new features. As part of this project we also adopted a naming convention that allowed a better understanding of the code.

Speech recognition

Speech recognition was used for pin and password authentication. Pin and password could have any number from 0 to 9 and any letter from A to Z including Y, W and K.

The initial testing revealed that Portuguese language had some challenges with letter recognition, local accent aside, we have letters that sound very similar causing confusion. If for letters like ‘I’ and ‘E’ the recognition accuracy was above 75% for others like ‘U’ and ‘V’ was below 20%. The *go life* condition (in other words put this functionality in production) was recognition accuracy of 85% in all characters (letters and numbers). After some root cause analysis I have defined 2 working streams:

a) Hardware and software configuration; and
b) Phonetic learning configuration.

I have started by fine-tuning the software (Altitude and Loquendo) and the hardware (Dialogic cards). After very intense stress testing we reached a good compromise, but we were still very far from the 85% for ‘U’, ‘V’, ‘S’, ‘C’ and others. For numbers the results were already above the necessary threshold for go life.

Phonetic learning configuration was the next step, but not an easy one. In order for the system to learn it was necessary to create a new phoneme library, in other words a Loquendo grammar. That grammar was built based on having several people calling the system to capture phonemes (example: "\A w" = "\fd-a-b-l-j-u";"\a w" = "\fd-a-d-u-j-u").

User security and Personal Identified data (PID)

Some operations required user authentication, meaning the user had to provide a login and password to access the system, independent of being in the IVR or with a contact center agent that would be handled by the IVR. The main challenge here was when the user is already on the phone with the contact center agent and authentication was required. This means the call had to be sent back to the IVR, put the contact center agent on-hold until authentication took place, and retrieve the call once the user was successful authenticated or after 3 failed attempts. This was a delicate process prone to failure, so all the call events had to be monitored to ensure no calls were dropped. Also, the IVR channel

was blocked during the authentication process, so when calculating the number of IVR channels required for production this needed to be factored in.

User authentication process and all other private information like name and telephone number are considered personal identified data and could not be written in any logging system. To obey this criterion we created a module specific for PID logging.

The agent scripts were developed using ASL, and the script was divided in zones as illustrated in figure 1.

Figure 1.2; namely:

- Zone (1): Agent, campaign and Client information;
- Zone (2): Go back button;
- Zone (3): Menus;
- Zone (4): Operational area, that includes the operations the agent can execute according to the menu selected option;
- Zone (5): External access buttons; and
- Zone (6): Navigation buttons.

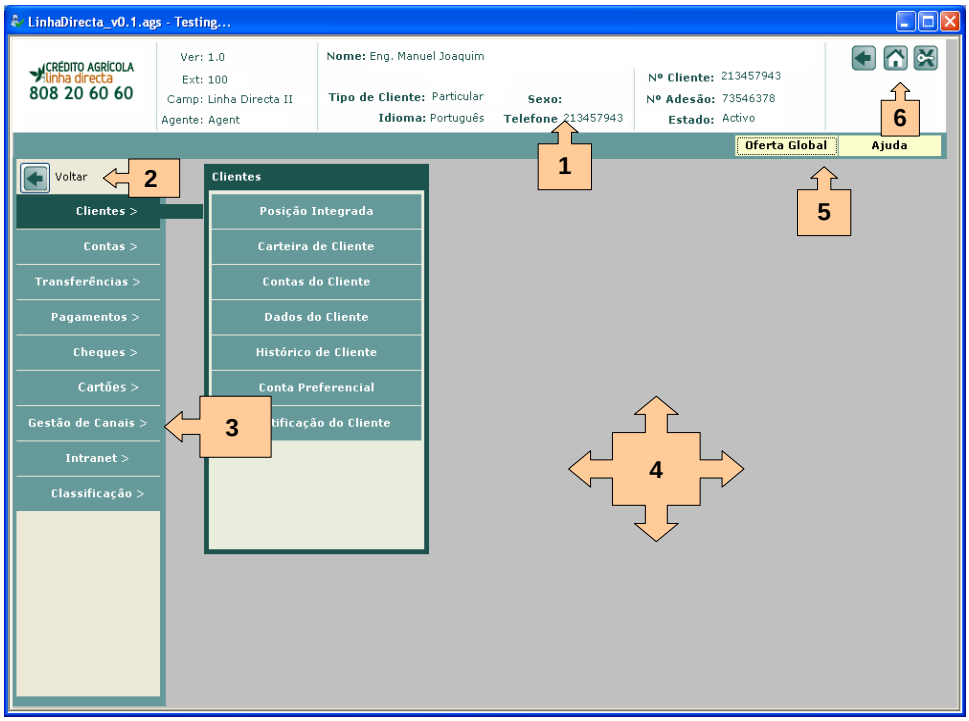

Figure 1.2 - View of the Agent script main menus.

As an example, if the agent choose the menu *Pagamentos* and then *Pagamento de Servicos* the application would exhibit a screen like the one in figure 1.Figure 1.3.

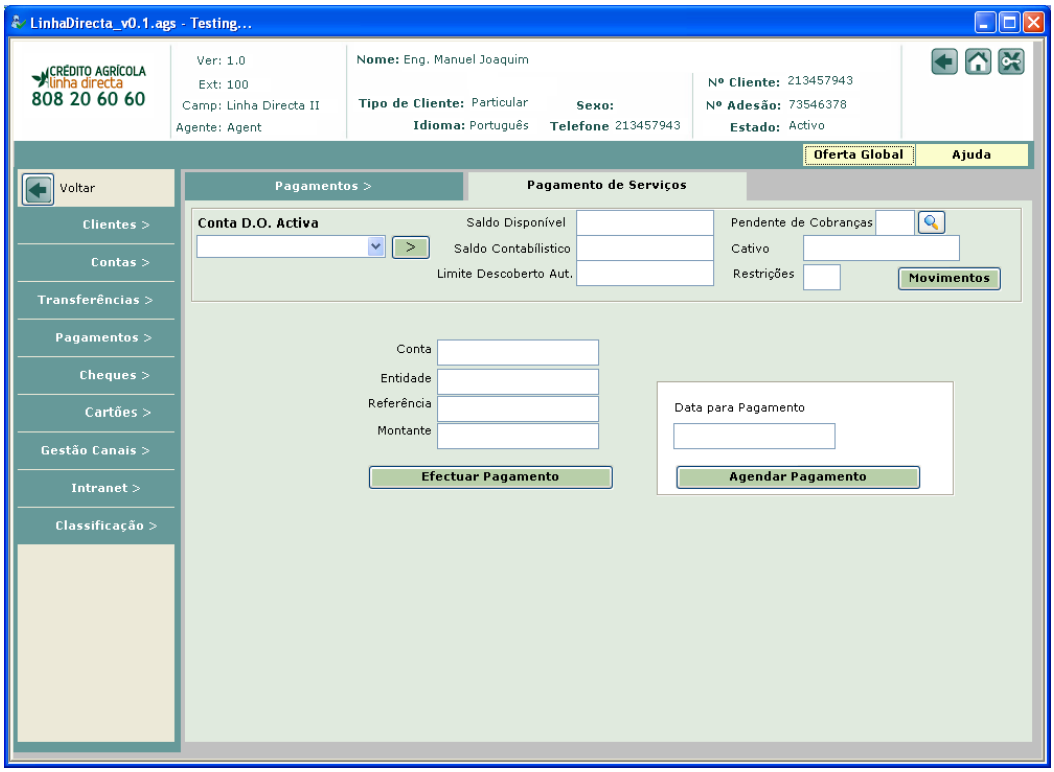

Figure 1.3 - View of agent script main screen.

After finishing the CCAM project, I was assigned to a new project at Círculo de Leitores. It was a four-week engagement where I was responsible to install Altitude xBOX, IP PBX and put in production two outbound campaigns. This was the first Altitude xBOX installation in Portugal and we had some challenges connecting with the SIP trunk provider. The outbound campaigns were developed with ASL, and the contacts were loaded into Altitude database from text files, exported directly from an Oracle database. After this project I was assigned to two smaller projects at TMN and Montepio, booth projects involving developing of ASL scripts and some .Net development.

In 2007 I was promoted to Senior Consultant (SC). At Altitude the SC is responsible for the project team, engagement execution within a formal Statement of Work (SoW) to drive predictable results in terms of project processes and outcomes (accomplished on time, on budget, and according to customer specifications). The SC is also responsible for project delivery quality, profitability and customer satisfaction, among other metrics.

1.1.4 Altitude Marketing Demos

My first project as Senior consultant was build the marketing demos. I was fully responsible for the project execution, team coordination and deployment.

The goal of this project was to create a Demo environment for Altitude uCI 7.5, shared by Altitude Pre-Sales and Sales Teams, to demonstrate the functions of Altitude uCI Suite. The Demo would be hosted at Altitude Lisbon offices and would include:

- Hosted demo;
- Local Demo (black box ready to be copied to any local machine); and
- Pre-recorded demo.

The technological challenge was to design an architecture to support local demo and a hosted demo, because the pre-recorded demo can derive from one of the previous ones. To address these requisites I proposed the use of VMware machines.

Using the VMware Technology we had two options for the Hosted Demo:

1. VMware Server - Free; and
2. VMware ESX Server – Payable.

In this document I only detail the VMware Server solution. VMware server architecture is depicted in figure 1.Figure 1.4

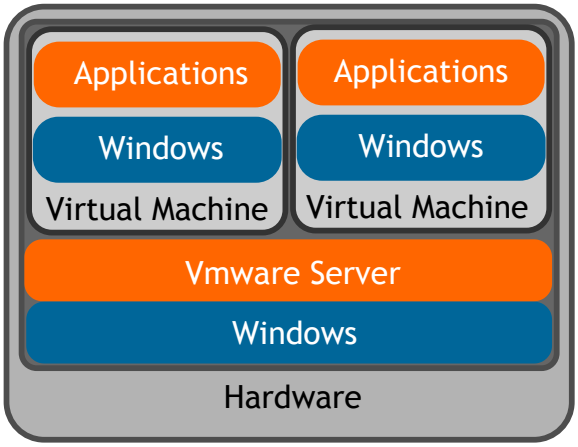

Figure 1.4 - VMware Server architecture.

A virtual machine is like a server, but instead of electronics, it is software, and runs operating systems and applications just like a physical server.

VMware server installs and runs as an application on top of a host operating system (Windows or Linux). A thin virtualization layer partitions the physical server so that multiple virtual machines can be run simultaneously on a single server. Computing resources of the physical server are treated as a uniform pool of resources that can be allocated to virtual machines in a controlled manner.

VMware Server isolates each virtual machine from its host and other virtual machines, leaving it unaffected if another virtual machine crashes. Data does not leak across virtual machines and

applications can only communicate over configured network connections. VMware Server encapsulates a virtual machine environment as a set of files, which are easy to backup, move and copy.

The hosted demo environment consists on a hosting machine with a vMware Server installed. The vMware server host different virtual machines (Figure 1.5):

- vMware Master for vBox; and
- vMware Master for Altitude uCI Suite.

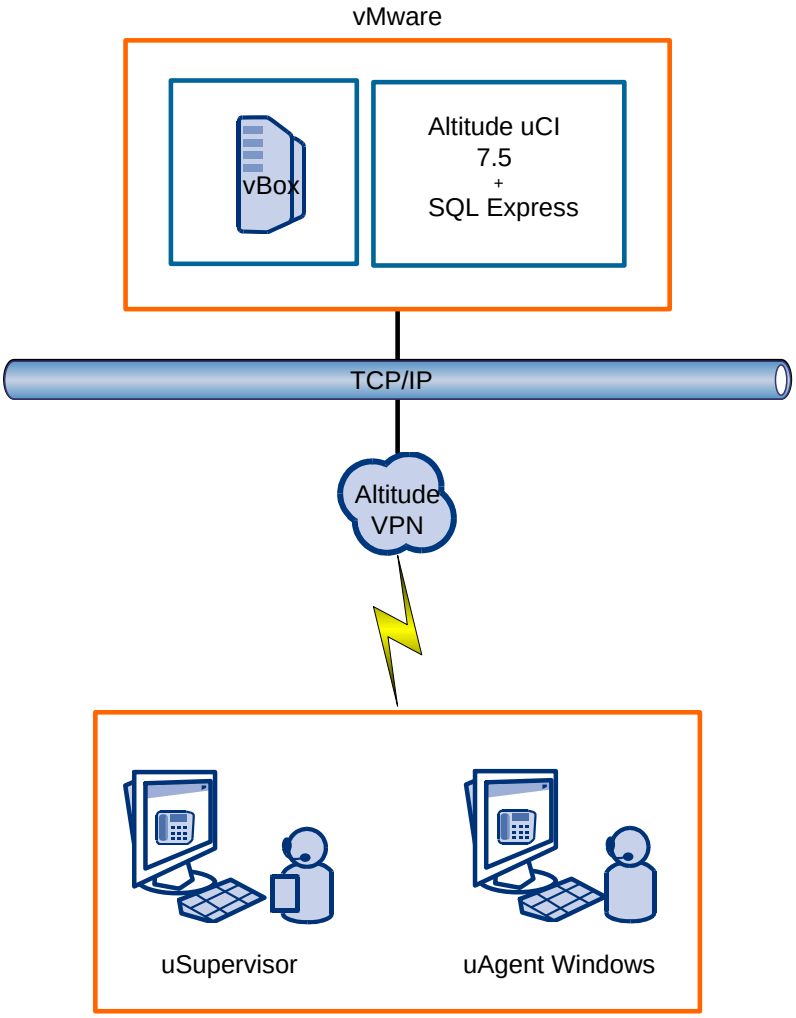

Figure 1.5 - Altitude marketing demos architecture.

The host machine was located in Lisbon offices and could be accessed through a VPN. The VMware machine is like any other machine in the network and could be accessed using Remote Desktop, VNC or VMware server console. It was also possible to configure the client applications, Altitude uCI uAgent Windows 7.5 and Altitude uCI Supervisor, to connect to the server.

The marketing Demos were composed of four groups of applications:

- Debt Collections;

- TeleSales/Telemarketing;
- CustomerCare/Claims; and
- HelpDesk.

The developed solution was based on Altitude uCI 7.5 and Altitude vBox. All the scripts were developed in English language using Altitude uCI Script Developer 7.5. The general “contact architecture” can be depicted through the diagram presented in figure 1.6.

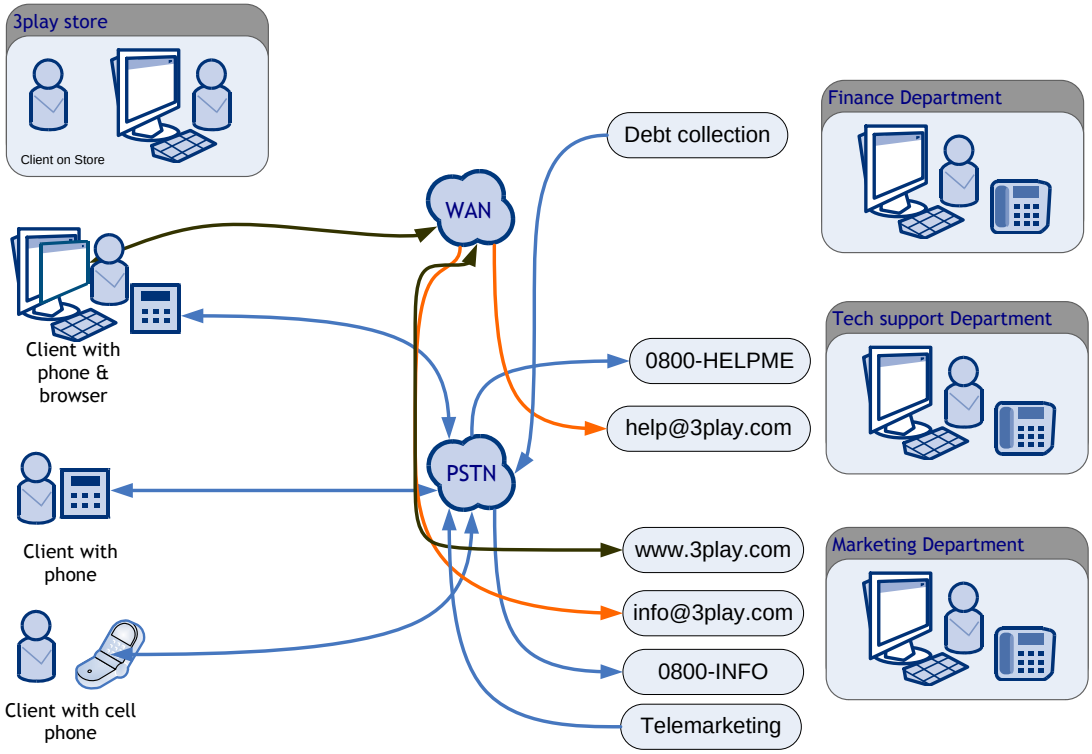

Figure 1.6 - Contact architecture.

Since Altitude is a multinational company, localization was one of the main requirements and the demos needed to be available in five languages. To fulfill this requirement the development used special tags that allowed generating a file with all the text that needed to be translated and incorporated the translations back. The IVR voices were recorded in all the five languages. Using campaign variables is was possible to configure the language pack to be used in any call for the IVR and for the agent scripts.

The project management part of the project was also challenging. The first phase of the project was requirements gathering with the pre-sales and sales teams spread around the globe, from Brazil to Dubai. All had mandatory, non-negotiable requirements and it was crucial to have clear sponsorship from Altitude General Manager to get the approval from all the teams to a two-phase plan. Time zone differences needed to be taken in account into planning for deliverables, testing and production, since all the teams had tasks to execute and there were several dependencies between them.

This system is still in use today as the demo system for Altitude. This project allowed me to develop my team management skills for on-site and virtual teams, including dealing with cultural differences and time zone impact on projects.

1.1.5 Porto Municipality, Gabinete do Munícipe

My next project was to implement the Contact Center for the Porto Municipality and train the teams that would be involved in the operations (supervisors) and maintenance and evolution (IT department). The contact center included an IVR and an agent campaign, both developed using ASL. Training the supervisor team was an interesting challenge due to the lack of computer knowledge of some of the trainees. This was my first project with a Municipality and my main take away from the experience was related to people's ability to do new tasks. Training the supervisors was a learning experience that allowed me to improve my communication skills. During my career in Altitude I delivered several trainings in several countries across Europe; and none was as intense regarding human dynamics as this one.

1.1.6 Mapfre

Mapfre had a contact center, based on Altitude Software technology, but was mainly for inbound calls, and Mapfre customers could call the contact center for questions, insurance claims etc. Mapfre had a huge number of open processes (ex: customer complaints, late payments) and the business team decided to create a process to proactively call the customers and accelerate the resolution of the processes. This new solution should be available for the contact center (Rua Castilho, Lisbon) and for all the insurance brokers in Portugal including Azores and Madeira.

In this project I was responsible for the project team and for the project development. This project had three very interesting challenges:

- Customer Selection Criteria: contacts are chosen based on the number of days the process is open. But once a contact is created in Altitude it can take days before the call takes place. During that period the contact (person) can go to an agency and close the process. So we needed to cater for this scenario and create a mechanism to cancel contact that are still in Altitude but the process was already closed.
- Business data: all the customer information was in Mapfre business databases, for security reasons Altitude could not access directly those databases.
- Insurance Brokers: they were not traditional contact center agents, they were geographic spread around the country and had no access to Altitude platform.

Every night a process was executed in the Mapfre database to select the people that would be contacted and the people whose processes were closed. The relevant business information was copied to an

Oracle external database and stored in views for performance reasons. Altitude developed a software broker that was responsible for reading the information from the views and to cancel or create the contacts in the Altitude campaign, according to the instructions associated to each contact. The execution time frame was critical as the broker needed to be ready to rollback the necessary operations if they were not finished before a defined timeline. If there were no contacts to load it was important to notify the DBA Administrator, as this could impact all the agents in the contact center. The broker included several alarm and logging mechanisms to cope with the mentioned requirements.

The agent scripts were created using ASL, and because the same person could be in several campaigns (campaigns were based on the type of process) we included a mechanism to allow the contact center agents to identify all the open processes associated to the same contact (person) and work on all of them during one call.

Insurance Brokers are not Mapfre employees, they do not have an active directory account or any other access to Mapfre infrastructure. To provide them access to the platform we used Altitude uAgent Web, web based application that works very similar to a webpage portal and provide them with a username/password to access the system. Several training sessions took place to instruct them on the technology and on the new system.

This project was delayed several times due to requirement changes and also because there was a huge dependency from Mapfre DBA team that could not deliver their part of the project in time. Negotiation, strong project management and team motivation were the skills I had consolidated during this project. This project is still in production and due to its success it was extended to include new functionalities.

1.1.7 One Contact, Portugal Telecom

In August 2008 I was assigned to a project in Portugal Telecom to work on a transformation project that PT was initiating.

Portugal Telecom decided to replace several internal applications, including contact center backend and front-end solutions, with Siebel CRM. This was a huge project and several companies were involved: Accenture was the responsible for all Siebel related developments; GMS as overall project management; Altitude took care of integration with contact center and finally PT as customer.

We had several Altitude teams working in parallel and I was responsible for the Altitude Consultant teams, and also the interaction point for all the other companies involved in the project.

A system migration of a 24x7 production environment is always a challenge, and combined with a roll-out of several new applications from different vendors is a massive challenge. Due to the complexity involved and my role in the project as team manager this project meets the selection criteria and is detailed in section 2.2.

In December 2009 I joined Microsoft as a Voice Technical Solution Specialist (TSP) responsible for the South of Europe Market (Portugal, Spain and Italy). The Voice TSP is responsible for delivering

business and revenue results by providing technical sales leadership with Microsoft's Unified Communications (UC) solutions − Lync Voice, Lync Server, Lync Online, across all device types. Building architectural design strategies, achieving customer buy-in for identified solution areas, discussion and delivery of technical presentations and roadmaps, driving customer decisions and deployments, and partnering with internal and external stakeholders for success were my main activities. As a TSP we must be prepared to discuss technical details like codecs (G.711, G.29, G.722, etc.), protocols (IPSEC, PSOM, RDP, etc.) and networking, but also have business conversations with key stakeholders that are only focused on user functionalities and business scenarios. We are also very exposed to competition so I had to understand very well the ecosystem namely the good, the bad and the ugly from our product and others and be prepared to argument. As TSP I had the opportunity to participate in several proposals across Portugal, Spain and Italy, in big companies from Telecom, Oil&Gaz and Public sector. I have learned that information, stakeholder management and a key sponsorship ideally very high in the company hierarchy are crucial to business sales. Soft skills are also a great differentiator in this area of business.

In December 2012, I joined the Microsoft Western Europe team as an Architect, responsible for developing the Enterprise Social and Communications business across 14 countries. While the TSP main function is to work with customers and promote product adoption, ultimately he/she is responsible for product licensing selling. The Architect has a very different role and is responsible for solutions. One of the core goals of the Architect is to understand the customer business and propose solutions that will solve problems or help achieve better business outcomes such as, increase the company productivity, reduce travel costs and enable mobility.

My first project as an Architect was to design a Communications Solution for a Multinational Pharmaceutical based in Switzerland. Under the umbrella of Communications Solution we included two main workloads: Voice and Video across all devices (mobile devices, laptops, Ipad, Android, etc). Designing a global architecture is much more complex than designing a local (country specific) architecture. It is necessary to take into consideration not only the technological aspects but also economics and local government laws that must be respected. By now this project is almost complete and is currently being handled by the local teams. Due to the complexity involved and because it was my first project as architect this project meets the selection criteria and is detailed in the session 2.3.

The next project was in oil&gas industry and the goal was to design a collaboration platform that would allow all the users, independent on the geographic location, to collaborate among each other.

Currently, I am involved in other big projects in retail, telecommunications and oil and gas. Two of these projects are related to Communication Solutions, designing a global architecture for all the users in the company that cover three datacenters located in Asian, Europe and Americas. The other project is related with Enterprise social and the goal is to help the company create an innovation hub to generate and capture new ideas from employee's partners and customers. Social provides an ability to tap into many stakeholders across the organization, and allows companies to improve product innovation through the diversity of ideas.

2. Most Relevant Projects

As described in session 1, for each phase of my career I chose one project which I find representative of my professional activity to be described in further detail. The project selection criteria was based on two pillars:

1) Technical challenge; and
2) My role and responsibility level.

In the remainder of this chapter, I describe the following projects:

- Database Purge, Caixa Geral de Depósitos (CGD);
- One Contact, Portugal Telecom; and
- Global Unified Communications, Multinational Pharmaceutical.

2.1 Database Purge, Caixa Geral de Depósitos (CGD)

This project was executed in 2005, and was in production until 3 years ago when CGD decided to replace the Altitude systems by another technology. The main technologies involved were AIX and Informix. This was my first project as a consultant and I was responsible for the overall solution from requirements gathering, development, quality assurance, train the CGD operations team and production.

I will start with a description of the problem including CGD requirements, followed by technical solution that was implemented and the rationale behind the decisions. As a summary, I will present the main project challenges.

2.1.1 Project requirements

Altitude Software relies heavily on the database as all activities imply some kind of access (reading and/or writing) to a database. Hence a fine-tuned database is fundamental for the health of the overall system.

The database contains the native product tables, created during the product installation, and other business tables that are created to support the contact center operation. Product tables are automatic populated by the Altitude uCI platform gathering all the events and operations executed. Business tables are populated by the agent script or other external applications. Production database contains approximately 50GB and some of the bigger tables are growing at 93% year-on-year.

The database size was problematic, causing operation problems as latency on database activities (ex: searches, inserts, updates or deletes), delays on peak hours to operations like login/logout of the agents open and close campaigns, also preventing software migrations.

CGD request was to create a backup process to move data from production to historical database, and from there to tape. This process must be automatic, configurable, traceable, preserve data consistency and executed overnight during the maintenance window without impacting any other application. In case of conflict, this process as low priority and if required should be stopped immediately maintaining database integrity.

Error! Bookmark not defined.

2.1.2 Technical solution and project execution

In terms of architecture see Figure 2.7 - Database Purge Architecturewe would need to have a historical database to maintain the information. But the data could be stored as flat data (without relational dependencies) as it was for consultation only.

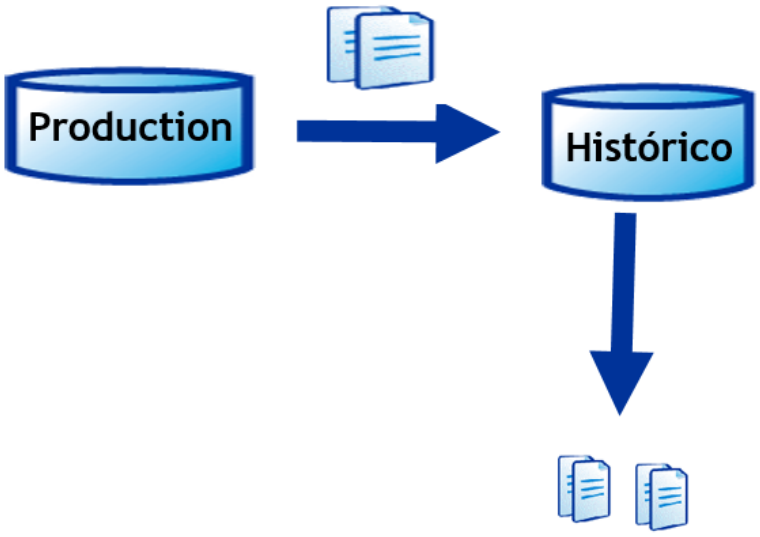

Figure 2.7 - Database Purge Architecture.

Then I started working on the what (what type of data would we delete and what would be the rules) and the how (how would the process be executed) questions.

Deleting data from a relational database is not a trivial operation. Data consistency must be preserved and, besides the expected dependencies among product tables, during the project I discovered dependencies between product and business data. This was totally unexpected and lead to extra complexity. It was necessary to find a key denominator among business data and product data that could be used as a deletion criterion. By key denominator I mean a date-time type parameter that would allow keeping consistency across the business and product data. After exhaustive testing on the quality environment it was possible to identify one parameter, *interaction_end_date*, to be used as target date-time but we had to include code to deal with exceptions. The production database included all the data

across several product migrations (ex: Altitude 4.04 to Altitude 5.1), so data integrity was inconsistent and it was necessary to handle those exceptions too.

To fulfill all the requirements I built a modular solution based on Shell script and database Store procedures and used the *crontab* configuration to automatically execute the process every day. The detailed architecture for the solution is in Figure 2.8 – Purge detailed Architecture

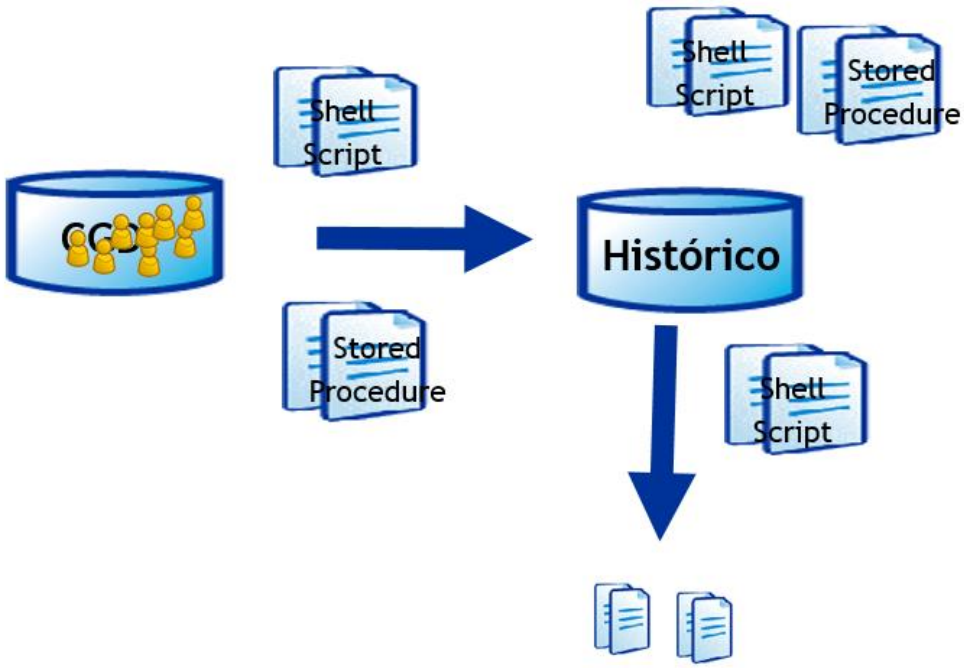

Figure 2.8 – Purge detailed Architecture.

Configuration and logging tables

Some configuration tables were created as part of the process to hold the information. These tables will contain all the necessary information to execute the purge, from date to logging flags. All the process executions are traced to file and to database as well as information about the result of the execution, total number of files copied or deleted and detail about the range of easycodes deleted.

Transfer data to historical database

To preserve data consistency, the information is first copied to temporary tables that reside in memory and then to the historical database. Deletion from production only happens once all the information is successfully copied. This allow us to copy more information in less time and the impact of a rollback is zero, as it will never be executed in production only on the historical database.

Transfer data from historical database to file

To execute this task we use Informix functions that allowed restoring the information into the database if needed.

2.1.3 Challenges

As expected we had several interesting challenges during the project, most related to data consistency but others related also to technology limitations.

Campaigns are created and eliminated as part of contact center operation, so that must be taken in consideration on the solution. When a campaign is created two tables are created ct_<campaign name) and cp_<campaign name>. Informix does not allow the creation of Store Procedures where the table name is a variable. Due to this limitation, it was necessary to recreate the store procedure that handles the CT table data before executing the copy/deletion of the campaign data.

A *lock* is a software mechanism that prevents others from using a resource. In Informix when a table is created, the default locking mode is page locking. With page locking, instead of locking only the row, the database server locks the entire page that contains the row. When one inserts, updates, or deletes a key (performed automatically when you insert, update, or delete a row), the database server creates a lock on the page that contains the key in the index. When one executes an INSERT, UPDATE, or DELETE statement, the database server uses exclusive locks. An exclusive lock means that no other users can view the row unless they are using the Dirty Read isolation level. In addition, no other users can update or delete the item until the database server removes the lock. Altitude product tables are created in lock row mode but business tables are not, this means Delete/Insert/Update operations implied page locking, which was unacceptable. It was necessary to change the lock mode of the business tables involved on the process.

Finally, when the project went life the reduced execution window combined with poor database performance caused a massive impact and we could not delete more than five days of data per night. The database had information since 1997-06-23 this meant it would take approximately 3 months to delete 1-year information, unacceptable. To overcome this we had a special permission to execute the purge on an extended window for two weeks. Every day, during those two weeks, after the purge execution all the database indexes and views were recreated this allowed us to reach and maintain the requirements of CGD, have maximum two years of data in the production database.

2.2 One Contact, Portugal Telecom

This project stared in 2008 and was deployed on November 2009. Portugal Telecom decided to replace several internal applications, including contact center backend and front-end solutions, with Siebel CRM. This was a huge project and several companies were involved: Accenture as the responsible for

all Siebel related developments; GMS as overall project management; Altitude took care of the integration with contact center and finally PT as customer.

We had several Altitude teams working in parallel and I was responsible for the Altitude Consultant teams, and also the interaction point for all the other companies involved in the project.

I will start with a description of the problem including Portugal Telecom requirements, followed by technical solution that was implemented and the rationale behind the decisions. As a summary, I will present the main project challenges.

2.2.1 Project requirements

This was a big project with several sub projects inside due to its complexity and the different business areas involved.

Siebel CRM was the new front-end and back-end solution across Portugal Telecom and should be able to handle all the necessary operations to have a contact center up and running without the need of other solutions. Portugal Telecom requirements were:

- Daily contact center operations like creating a campaign, creating agents, assign agents to campaigns, creating contacts, must be executed through Siebel CRM and not by Altitude uSupervisor.
- Statistic information about the contact center, available by default on the Altitude uSupervisor, should be made available to Siebel CRM.
- Changes in contact status due to Altitude Contact center operations must be reflected back on Siebel CRM. This must be executed daily within a pre-defined period during the nigh maintenance window.
- Portugal Telecom needed a mechanism to execute massive contact manipulation activities: load, update or cancel. This process would be executed daily within a pre-defined period during the nigh maintenance window.
- Functionalities classified as critical by Portugal telecom must support more than 5000 concurrent simultaneous request in pick hours.

2.2.2 Technical solution and project execution

When I analyzed the requirements, I identified the following characteristics:

- Real time vs. Background execution;
- Massive execution vs. unitary execution; and
- Performance.

Considering the characteristics mentioned above we decided to implement an architecture centered on Windows services, WebServices and batch files for massive execution. The overall architecture is described in Figure 2.9 – One Contact Center Architecture.

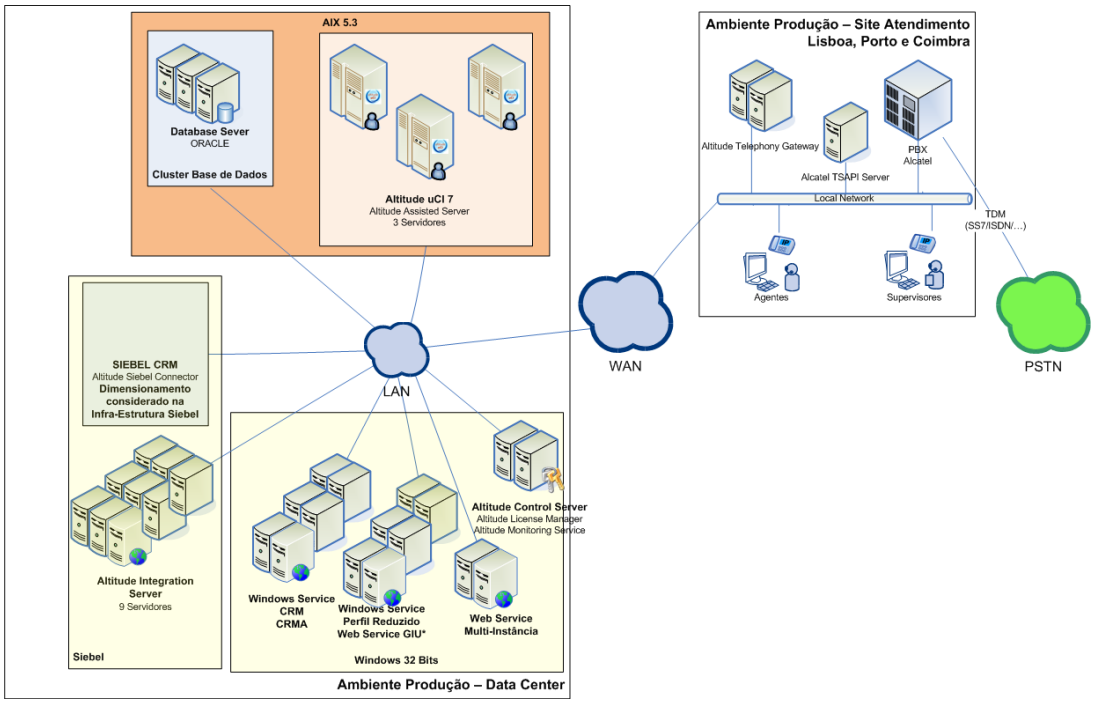

Figure 2.9 – One Contact Center Architecture.

Background execution: Windows Services

Microsoft Windows services, formerly known as NT services, enable the creation of long-running executable applications that run in their own Windows sessions. These services can be automatically started when the computer boots, can be paused and restarted, and do not show any user interface. These features make services ideal for use on a server or whenever we need long-running functionality that does not interfere with the users that are working on the same computer. Microsoft Windows services can also run in the security context of a specific user account that is different from the logged-on user or the default computer account.

All background activities were implemented using Windows Services, example the statistics update from the Altitude database to Siebel CRM (project CRM and CRMA).

Real time: Web Services

Web services extend the World Wide Web infrastructure to provide the means for software to connect to other software applications. Applications access Web services via ubiquitous Web protocols and data formats such as HTTP, XML, and SOAP, with no need to worry about how each Web service is implemented. It has an interface described in Web Services Description Language (WSDL).

All real time activities, such as the Altitude GIU, were implemented using Web Services.

Massive execution vs. unitary execution

Multi-threading is a widespread programming and execution model that allows multiple control flows to exist within the context of a single process. These threads share the process' resources, but are able to execute independently. The threaded programming model provides developers with a useful abstraction of concurrent execution.

The contact instructions were the same independent of being executed massively or individually. Based on this we decided to use the concept of multi-threading and use the same web service for the massive contact manipulation and the unitary execution. Multi-thread was used for operations like load, update or cancel contact.

When using multi-thread one must be careful in order to avoid race conditions and implement rendezvous in time to ensure that data is updated in the correct order. For example first we have to create the contact and only then we can update his attributes like phone number. On our scenario *updating threads* could only start once all the *create contact threads* terminated and cancel could only be executed once update was finished.

Performance

All the data for the massive execution was stored in a stage database. Some of the staging tables were used for read and write operations causing deadlocks impacting the duration of the process. During the first tests we were not able to treat more than ten contacts per minute, which was unacceptable.

A semaphore is a synchronization primitive that controls access to a pool of resources. Or, in other cases, limits the number of concurrent accesses to a single resource. A semaphore can be a variable that each process can check and then change. Depending on the value that is found, the process can use the resource or will find that it is already in use and must wait for some period before trying again. Semaphores can be binary (0 or 1) or can have additional values. Typically, a process using semaphores checks the value and then, if it using the resource, changes the value to reflect this so that subsequent semaphore users will know to wait.

As a solution we implemented a semaphore system, to control the access for read and write operations on the database. When we constructed the semaphore object the associated count that was initialized. This count was the number of concurrent connections. Each time a thread entered the semaphore the count was decremented. When the count was zero, any thread that attempted to enter the semaphore would block until some other thread released the semaphore. The semaphore was not enough it was necessary to create a queue also to ensure the threads were accessing the database on a FIFO base.

This solution had a positive impact in the performance, and during stress test we were able to treat more than one hundred contacts per minute.

2.2.3 Challenges

Project management was by far the most complex challenge I had on this project, not only because several companies were involved but also due to technical dependencies among all the different projects. Not counting the interactions with other teams I was responsible for nine Altitude consultants and five simultaneous projects.

This was a software house and all the interfaces were discussed, documented and closed in the beginning of the project. Halfway through the development phase we received a request to change one parameter (instead of receiving an integer example 3 we would receive a decimal example 3.00) in one of the interfaces. This might sound as very simple request but it is not. If the interface is prepared to receive a parameter as integer only the first digit will be used and the rest is truncated; meaning 3.99 or 3.01 would be treated as 3 witch was not acceptable.

This lead to several change requests across the different project and end-up delaying the overall production date. Manage in-scope versus out-of-scope was a daily task, even though all the activities are very well documented and it is clear what is included in the scope of the project. One must be prepared to handle all kind of pressure to include *"just this little change here it is really easy just 5 minutes"* and to ensure the team is shielded from these constant interruptions.

Today, looking back at this experience, I recognize this was probably one of the most important projects I had the pleasure to participate, because I learned a lot not only regarding technology but about team dynamics, strong personality, negotiation, strategy, leadership and command.

2.3 Global Unified Communications, Multinational Pharmaceutical Company

This was my first project as an Architect, design a Communications Solution for a Multinational Pharmaceutical based in Switzerland. Under the umbrella of Communications Solution we include two main workloads: Voice and Video for the company across all devices (mobile devices, laptops, Ipad, Android etc).

In this project I was responsible for designing the initial architecture regarding the datacenters and sub-regions Europe and Americas. By now this project is almost complete and is currently being handled by the local teams.

I will start with a description of the problem including customer requirements, followed by technical solution that was implemented and the rationale behind the decisions. As a summary, I will present the main project challenges.

2.3.1 Project requirements

The project requirements are to design a global Communications Solution Voice and Video across all devices (mobile devices, laptops, Ipad, Android etc). Voice and Video are critical to the organization so

High availability and Disaster Recovery must be implemented as part of the global project with a Service Level Agreement (SLA) of 99,9999% uptime.

2.3.2 Technical solution and project execution

When designing this global Enterprise Voice & Video architecture there are some critical factors that must be taken into consideration:

- Voice Communication Legislation;
- Voice Costs;
- Network readiness;
- Disaster Recover and High Availability; and
- Sites and Deployment.

Voice Communication Legislation

Voice is considered is critical and every country has specific rules to handle Voice and Video communications. For example projects deployed in United States of America must adhere to Enhanced 911(E911). E911 is a system that links emergency callers with the appropriate public resources. The incoming 9-1-1 call is typically answered at the Public Safety Answering Point (PSAP) of the governmental agency that has jurisdiction over the caller's location. Projects deployed in the European Union must follow the EU Legislation on 112 that states declares the obligations as for example, operators must provide information about caller location to emergency authorities. If this rules are note respected peoples life's can be in danger. I will never forget when we were on the first architecture design sessions and the customer told me *"we have factories around the globe and work accidents are a reality, people die if their phone does not work".* In this project we worked with the telecom providers to ensure all the rules were followed. In the case of the United States the Lync product includes all the necessary features required by law.

Voice Costs

For Enterprise Voice (EV) deployments we have to consider 2 types of network traffic: SIP and Media. Let's assume we have one datacenter in Lisbon with 1000 users and we have a site in Angola with 500 users and we do not have a local PSTN connection neither Video Conference Bridges. When a user in Angola calls a number in Angola, because there is no local PSTN connection, all the traffic (SIP and Media) will come to Lisbon by the MPLS network and the call will exit through the PSTN in Lisbon. This has a massive impact on costs (the call will be considered an international call from Lisbon to Angola) but also on Network bandwidth consumption (for example G.711 codec consumes 156.0 bps).

So when designing a global architecture one must start by identifying the sites (physical locations) where EV will be deployed, network regions to which those sites belong to and existing PSTN and/or SIP Trunk connectivity.

Network Readiness

A good Network is one of the key success factors for a good project. To determine the suitability of the production network to support Lync real-time media workloads, a Lync Network Assessment must be executed. The data provided by the Lync Server 2013 Network Assessment is considered a critical input into the planning and design of Lync Global Architecture. The assessment is not dependent on Lync infrastructure or components of any type and is an independent activity that is typically done in parallel to planning activities prior to completion of the design of the Lync Global Architecture.

Disaster Recover and High Availability

Lync Server 2013 provides high availability (HA) by server redundancy via pooling. If a server running a certain server role fails, the other servers in the pool running the same role take the load of that server. Disaster recovery (DR) can be enabled by pool pairing, we designate a pairs of Front End pools, with each pool in a pair located in a separate data center, and in a separate geographical area. If one pool or site goes down, we can redirect the users of that pool to use the other pool in the pair, with minimal interruption of service.

Sites and Deployment

Let's assume this company has 300 sites, when creating a global architecture we have to group the sites. It is not possible or feasible within the project timelines to design and deploy 300 different site architecture configurations. We have to create site classifications based on office size, type of connectivity, PSTN provider. In this case we created four classification types:

- Site type 1: 2000 users, Session border controllers and PSTN gateway(s);
- Site type 2: 500 users, Survivable branch appliances and PSTN gateway(s);
- Site type 3: 50 users, Small Survivable Branch Communication and PSTN gateway(s); and
- Site type 4: 10 users or less, No PSTN gateway(s).

This allowed us to have four templates (one template for each type) and deploy all the sites following a standard approach. An example of a reference architecture is in figure 2.Figure 2.10.

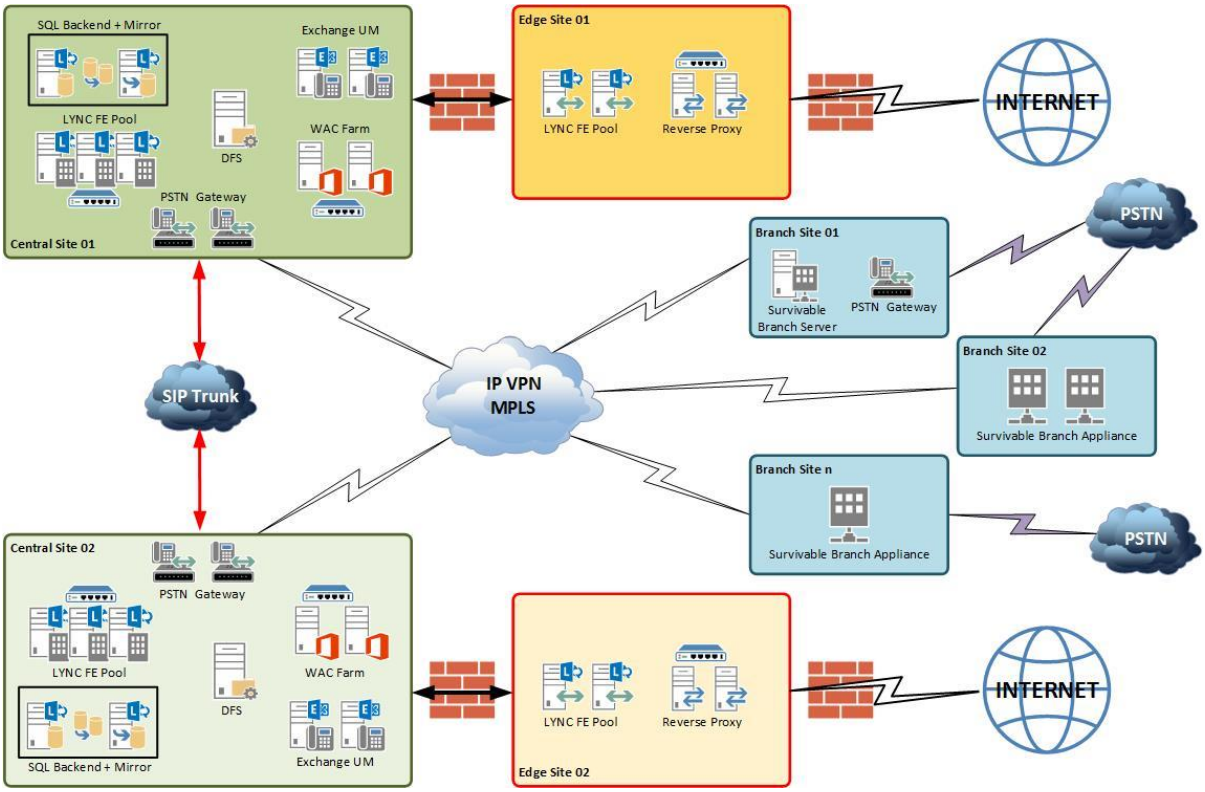

Figure 2.10 – Example of a Lync Reference Architecture

2.3.3 Challenges

The main challenges on this project are integration with legacy video devices, existent voice and video vendor contracts (termination penalty fees) and change management.

I will focus only on the integration with legacy video devices and the lack of interoperability.

In the video world each vendor uses different codecs and most of them are not compatible. Microsoft Lync Video Interoperability Program tests and qualifies partners' video solutions to provide interoperability with Microsoft Lync Server. Microsoft Lync provides interoperability with three different types of video solutions:

- Video teleconference (VTC) - A video endpoint registers directly with Microsoft Lync Server and provides a seamless user experience so that Lync users can connect to the VTC systems as if it were another contact. The VTC system will appear with presence information and allow user to one click initiate video calls to the VTC.
- Multipoint control unit (MCU) **-** A multipoint control unit allows for multi-party conferencing by providing users the use of virtual room or video bridge where multiple parties can connect and conduct video conferencing. These virtual rooms/video bridges will appear in the Lync contact list to allow those users to connect and participate in multiparty video calls.
- Gateway (GW) - A gateway allows connection with different network and provides Microsoft Lync access to different protocols to make video calls. Microsoft Lync uses SIP for signaling

and H.263 and RTVideo as the video codecs. Gateways provide access to other protocols such as H.323, H.261 and H.264. ‘Optimized for’ – IP phones, headsets, conference room systems and other devices that offer a rich and integrated experience giving customers the power to get the most out of their Lync experience and return on investment.

Even with this program we have several equipment’s that are not compliant and it is mandatory to do an exhaustive list of all the available legacy systems. In the scenario of the current customer it was possible to use a gateway from another vendor to connect the different legacy systems with Lync server.

3. Career analysis

When I graduated I was far from imagining how complex and exiting the IT world was, and what I would accomplish.

In the last 13 years of practice the preparation I obtain during my degree in Informatics Engineering revealed itself as extremely valuable, especially for the technical jobs. My first job was Technical support engineer, a deep technical job that is also very demanding in terms of pressure, customer exposure and timings. It was a good training and I have gathered much learning that I still apply today. I worked with several Technologies, some of them do not exist anymore, and I seen a few Technologies shifts already, from analog to digital, from PBX to IP-PBX and now to SIP. Yes, there was a lot of innovation in the past few years but there are key concepts that remained valid. With a university degree besides the subject competencies we also acquire a studding/learning method that allows us to follow the development and innovation and for me that is equally important.

On the other side I can say I worked with 90% of the nationalities in the world, from New Zealand to Portugal, and in projects across the five continents. This is a learning experience by itself and there is nothing at University that will prepare you to that.

When, in 2008, I evolved into the project manager role, I felt that I needed to learn more and I did the Project Management Essentials training and completed the Project Management Professional (PMP)® credential is the most important industry-recognized certification for project managers. Globally recognized and demanded, the PMP® demonstrates that one have the experience, education and competency to lead and direct projects. Besides being a very well recognized certification in the industry, obtaining the certification implies that one follows standard best practices and methodologies regarding Project Management. I had the opportunity to take advantage of this certification first at Portugal Telecom and still today in most of my activities.

Final remark after 13 years analyzing all the projects I have done I can state that the soft skills are as important as the technical skills in the Enterprise Market. I have observed excellent technical projects failing because people could not communicate. And I also seen the contrary, projects where the consultants had technical difficulties but good communication skills and they were able to deliver a great project, on time and on budget on scope. During my degree I had a few disciplines focused in soft skills I today I understand that was really important and valuable, and should become a best practice for all the engineers' degrees.

The four mega-trends (at least for Microsoft) Enterprise Social, Big Data, Devices and Cloud computing will guide the market in the next years.

Starting in July I will become responsible also for Big Data. Combination of Big Data and Enterprise Social is raw diamond. The Data scientist, many say, will be the most rewarded profession of the future. Using telemetry data mixed with sentiment analysis to predict and change people's behavior (Tesla is already doing it today). At the same time my career is moving towards a management path. My plan is to start preparing for a Master of Business Administration (MBA).

4. References

1. [Altitude] http://www.altitude.com (last accessed in 2014-05-08).
2. [Microsoft] http://www.microsoft.com (last accessed in 2014-05-08).
3. [InovContacto] www.portugalglobal.pt/PT/InovContacto (last accessed in 2014-05-08).
4. [Loquendo] http://www.nuance.com/for-business/by-solution/customer-service-solutions/solutions-services/inbound-solutions/index.htm (last accessed in 2014-05-08).
5. [Dialogic] http://www.dialogic.com (last accessed in 2014-05-08).
6. [112 legislation] http://ec.europa.eu/digital-agenda/en/eu-rules-112#eu-legislation-on-112(last accessed in 2014-05-08).

5. Appendices

5.1 Education

- LEI – Informatics Engineering, University of Coimbra, 1995-2000. Grade: 14
- PMI certification, May 2009, PMP #1258202

5.2 Certifications & Trainings

2014

- Talking Trade training, 4 and 5 March 2014, Microsoft Schiphol, Netherlands
- Microsoft TechReady18, 27 to 31 January 2014, Seattle United States. Speaker and attendee
- Architect Summit18, 1 to 2 February 2014, Redmond United States. Speaker and IT optimization Track Lead

2013

- Catalyst, November 21st 2013, Microsoft Portugal, Lisbon
- Technical Leadership Program, September 2013, Microsoft Schiphol, Netherlands
- Microsoft TechReady17, 22 to 26 July 2013, Seattle United States. Speaker and attendee
- Developing a Value Proposition, 18 to 19 July 2013, Seattle United States
- Working at the Speed of Trust, April 21 2013, Microsoft Portugal, Lisbon
- IASA Foundation Training, 17 to 28 February 2013, Online Training
- Architect Summit16, 9 and 10 February 2013, Redmond United States
- Microsoft TechReady16, 4 to 8 February 2013, Seattle United States
- Consulting The Microsoft Way - Microsoft Services University, 23 January to 2 February Redmond United States

2012

- Working at Speed of Truth, April 2nd 2012, Microsoft Portugal
- Voice Ignite Microsoft Lync 2013, 15 to 19 October 2012, Frankfurt, Germany

2011

- Cross-Boundary Collaboration, 13 to 14 October 2011, Microsoft Lisbon, Portugal
- Executive Bench Year 2, 5 to 9 September 2011, Riga, Latvia
- Ergonomics, 10 to 11 March 2011, Microsoft Paris, France

- Microsoft TechReady12, 14 to 18 February 2011, Seattle United States
- Executive Bench Year 1, 27 to 28 January 2011, Microsoft Munich, Germany
- Influence at Microsoft: A Framework for Effective Influence, 20 to 21 January 2011, Microsoft Reading, UK

2010

- Voice Ignite Microsoft Lync 2010, 6 to 10 September 2010, Microsoft Istanbul, Turkey
- Executive Bench Year 1, 30 to 31 August 2010, Marienlyst Denmark,
- Microsoft TechReady10, 22 to 26 March 2010, Seattle United States
- TSP ramp-up, 15 to 19 February 2010, Microsoft Schiphol, Netherlands
- Voice Ignite Microsoft OCS 2007 R2, 11 to 15 January, Microsoft Istanbul, Turkey

2009

- Neurolinguistic programming, evolui.com, 6 to 27 February 2009

2008

- .NET best Practices and Design Patterns: Hands-on, Learning Tree, May 2008, Lisbon, Portugal

2007

- Project Management Essentials, Learning Tree, February 2007, Lisbon, Portugal

2006

- Asterisk configuration and administration, Rumos, May 2006, Lisbon, Portugal

2005

- Altitude Train the Trainer, May 2005, Altitude Lisbon, Portugal

2004

- Altitude uCI 7 Administration and Troubleshooting, January 2004, Altitude Lisbon, Portugal
- Altitude uCI 7 Scripting, January 2004, Altitude Lisbon, Portugal

2003

- Altitude uCI 6 Administration and Troubleshooting, September 2003, Altitude Lisbon, Portugal
- Communication, Nova Etapa, May 2003, Lisbon, Portugal
- Project Management Fundamentals, Rumos, 17 February to April 3rd 2003, Lisbon, Portugal

2002

- Time Management, Cecoa, November 2002, Lisbon, Portugal

2001

- Altitude Easyphone 5.1.C5 Administration and Troubleshooting 5.1.C5, May 2001, Altitude Austin, United States
- Altitude Easyscrip 5.1.C5, May 2001 Altitude Austin, United States

2000

- Altitude Easyphone 4.0 administration and troubleshooting training, November 2000, Altitude Lisbon, Portugal
- International Management ICEP, Programa Contacto, October 2000, Lisbon, Portugal

5.3 Companies

5.3.1 Microsoft

Founded in 1975, Microsoft (Nasdaq "MSFT") is the worldwide leader in software, services, and solutions that help people and businesses realize their full potential. Microsoft has 67 subsidiaries and 100000 employees worldwide.

Microsoft is a Device and services company providing solutions for consumer (ex: Skype, SkyDrive, Xbox & Kinect) and enterprise (ex: Sharepoint, Lync, Office 365) market.

5.3.2 Altitude Software

Altitude Software is the leading independent contact center vendor for unified interaction solutions. Founded in 1993, as Easyphone, has 300 employees and offices in 17 countries as illustrated in Figure 5.11. As a truly global and multicultural organization, Altitude combines various languages from 25 nationalities. Altitude Software is also recognized for its leadership in the contact center outsourcing market.

Figure 5.11 - Altitude Software office Locations.

The Altitude uCI suite is a comprehensive solution that enables the management of all customer interactions − Voice, VoIP, Email, SMS/MMS, Fax, Messaging or Web − and resulting activities in a unified environment. Figure 5.12 describes Altitude Software Products.

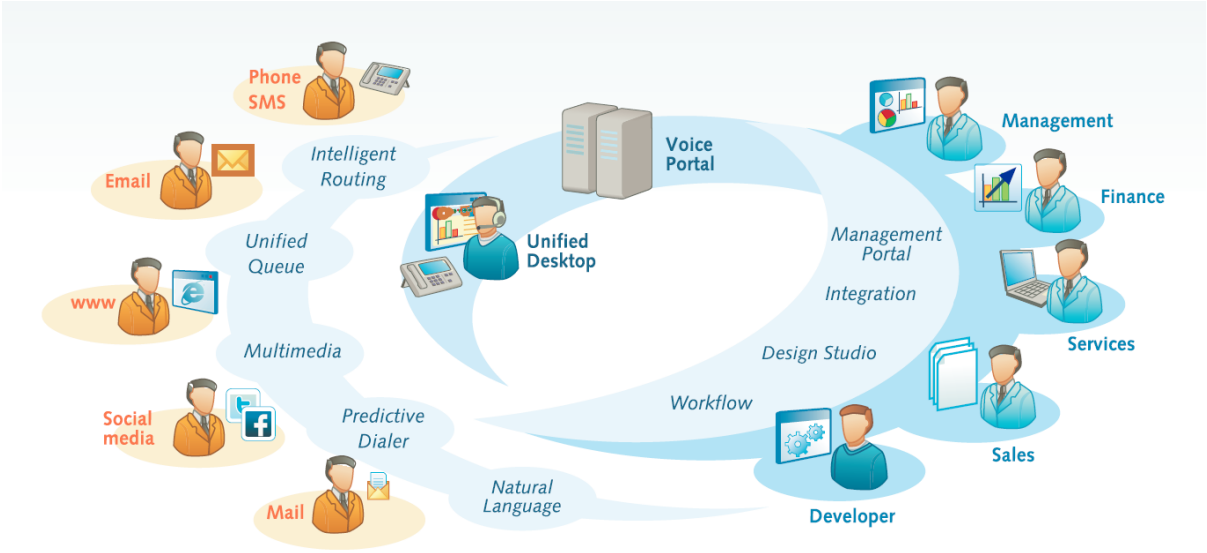

Figure 5.12 - Altitude Software Products.

5.3.3 Programa Contacto AICEP

Programa Contacto 4 – International internships program. It is a government initiative to provide international work experience for the Portuguese university graduates, mainly from the fields of Management, Economy and Engineering.

The program is funded by QREN/POPH and includes the following phases:

- Phase 1: International Management training, 2 weeks, provided by national teachers from Catholic University of Portugal and international teachers from fellow universities;
- Phase 2: Internship in Portugal at a designated company, 3 months;
- Phase 3: Internship abroad at a designated company, 9 months and
- Phase 4: Seminary and close event.

The program is currently on the 16th edition, counting already 45000 applicants, and only 3800 trainees accepted.

Trainees will be assigned to companies like Cisco, Portucel, Bial and efacec (full list of companies in the Figure 5.13) and markets strategic to Portugal.

Figure 5.13 - INOV Contacto designated companies for the internships in Portugal and abroad.